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Biographies of Committee Members and Staff

C.1 COMMITTEE MEMBERS

JOHN C. WOOLEY (*Chair*) is the associate vice chancellor for research, University of California at San Diego (UCSD), an adjunct professor in pharmacology, and in chemistry and biochemistry, and a strategic advisor and senior fellow of the San Diego Supercomputer Center. He received his Ph.D. degree in 1975 at the University of Chicago, working with Al Crewe and Robert Uretz in biological physics. Dr. Wooley created the first programs within the U.S. federal government for funding research in bioinformatics and in computational biology and has been involved in strengthening the interface between computing and biology for more than a decade. For the new UCSD California Institute for Telecommunication and Information Technology (Cal-(IT)2), Dr. Wooley directs the biology and biomedical layer or applications component, termed Digitally-enabled Genomic Medicine (DeGeM), a step in delivering personalized medicine in a wireless clinical setting. His current research involves bioinformatics and structural genomics, while his principal objectives at UCSD are to stimulate new research initiatives for large-scale, multidisciplinary challenges. He also collaborates in developing scientific applications of information technology and high-performance computing; creating industry-university collaborations; expanding applied life science opportunities, notably around drug discovery; and establishing a biotechnology and pharmacology science park on UCSD's health sciences campus zone.

ADAM P. ARKIN is a faculty scientist in computational and theoretical biology at Lawrence Berkeley National Laboratory, an assistant professor of bioengineering and chemistry at the University of California, Berkeley, and an investigator of the Howard Hughes Medical Institute. His focus is on detailed modeling of genetic and biochemical networks with emphasis on developmental systems. The Arkin laboratory applies theoretical and computational analyses from dynamical systems, stochastic processes, chemical kinetics, and statistical mechanics and methods from molecular biology to determine the principles of cellular signal processing and to aid in design of custom cellular circuitry that may, for example, act as sensitive biosensors.

ERIC BRILL is a researcher in the Machine Learning and Applied Statistics Group at Microsoft Research. His research interests include natural language processing (primarily empirical natural language processing), speech recognition and spoken language systems, machine learning, and artificial

intelligence. Some specific research topics include lexical disambiguation, parsing, classifier combination, spelling correction, and language modeling. Before joining Microsoft, he was an assistant professor of computer science at Johns Hopkins University. He has served on the editorial board of *Computational Linguistics* and the *Journal for Artificial Intelligence Research*. Dr. Brill received his Ph.D. in computer science from the University of Pennsylvania in 1993.

ROBERT M. CORN is a professor in the Department of Chemistry at the University of California, Irvine. Dr. Corn is a leader in the development and application of surface-sensitive spectroscopic techniques such as surface plasmon resonance (SPR) imaging, optical second harmonic generation (SHG), and polarization modulation Fourier transform infrared (PM-FTIR) spectroscopy. His primary research interests include the study of biopolymer (e.g., DNA, protein) adsorption onto surfaces and the chemical modification of surfaces for the creation of ultrathin films and adsorption-based biosensors. Professor Corn also has ongoing research projects in the implementation of DNA computing algorithms at surfaces and the study of ion transfer processes at liquid-liquid interfaces. He received a B.A. in chemistry summa cum laude in 1978 from the University of California, San Diego, and earned a Ph.D. in 1983 from the University of California, Berkeley, under the direction of Professor Herbert L. Strauss in the application of FTIR to the study of motion in molecular solids. From 1983 to1984, Professor Corn was a visiting scientist at the IBM Research Laboratory in San Jose, California, where he applied the techniques of surface plasmon-enhanced Raman scattering and optical SHE to electrochemical surfaces. In 1985, Professor Corn moved to Wisconsin where he was a member of the Analytical Sciences Division of the Department of Chemistry and the Water Chemistry Program until 2004. In July of 2004, he moved to the University of California, Irvine, where he joined the Department of Chemistry. Professor Corn is a co-founder of two companies: GWC Technologies, Inc., maker of SPR instrumentation and other surface spectroscopic equipment, and GenTel BioSurfaces, Inc.

CHRIS DIORIO is an associate professor of computer science and engineering at the University of Washington. His research focuses on building electronic systems that employ the computational and organizational principles used in the nervous systems of living organisms. This work on neurally inspired computing includes studies of computing with action potentials, silicon learning systems, and implantable computers. He also works on high-speed circuit design. Dr. Diorio teaches courses in both digital electronics and integrated-circuit (IC) design, and is developing new course material in two areas: (1) alternative computing paradigms, including neural, quantum, and DNA computers, and (2) digital IC design at microwave clock frequencies. He received a National Science Foundation (NSF) Presidential Early Career Award in 1999. Dr. Diorio was awarded a 5 year Packard Foundation Fellowship in science and engineering in 1998 and also an NSF Career Award that same year. In 1996, he was awarded the Electron Devices Society's (EDS's) Paul Rappaport Award for the best paper in an Institute of Electrical and Electronics Engineers EDS publication. He completed his doctoral research in electrical engineering at the Physics of Computation Laboratory, California Institute of Technology, in 1997. Dr. Diorio has also served as a senior staff engineer for TRW, Inc., and as a senior staff scientist for American Systems Corporation. He received his B.A. in physics from Occidental College in 1983 and his M.S. in electrical engineering in 1984 from The California Institute of Technology.

LEAH EDELSTEIN-KESHET is a professor of mathematics at the University of British Columbia. She received her Ph.D. in 1982 from the Weizmann Institute of Science in Rehovot, Israel, specializing in applied mathematics and working with Professor Lee A. Segel. She is a member of the Mathematics Department and the Institute of Applied Mathematics at the University of British Colombia. She is also a former president of the Society for Mathematical Biology. Although her main area of interest is mathematical biology, Dr. Edelstein-Keshet works in several areas, including the molecular biology of the cytoskeleton, the dynamics of swarming and social organisms and, more recently, models for neuroinflammation in Alzheimer's disease and pathogenesis of type 1 (autoimmune) diabetes.

MARK H. ELLISMAN is professor in the Department of Neurosciences at the School of Medicine and the Department of Bioengineering, director of the National Center for Microscopy and Imaging Research at UCSD, and chair of the San Diego Supercomputer Center (SDSC) Executive Committee. Dr. Ellisman's research focuses on cellular neurobiology and the dynamic interplay between structure and function in the nervous system, with a focus on excitable membrane properties and enabling remote access to large-scale scientific instrumentation. At UCSD, Dr. Ellisman is director of the Center for Research in Biological Structure and director of the Neurosciences Laboratory for Neurocytology. Since 1997, he has been the neuroscience thrust leader and cross-disciplinary coordinator for the National Partnership for Advanced Computational Infrastructure. Dr. Ellisman is a member of the American Association for the Advancement of Science, Society for Neurosciences, and American Institute for Medical and Biological Engineering. He has served on numerous editorial boards and has been associate editor of the *Journal of Neurocytology* since 1980. Dr. Ellisman is a also grant reviewer for organizations such as the National Institutes of Health and the National Science Foundation, and a consultant for associations such as the Association for Advanced Technology in the Biomedical Sciences and Pfizer. He has published numerous journal and conference articles and technical reports. He holds a Ph.D. degree in biology and an M.A. degree in neurophysiology both from the University of Colorado, Boulder, and an A.B. degree with honors from the University of California, Berkeley.

MARCUS W. FELDMAN is a professor of biological sciences at Stanford University. He uses applied mathematics and computer modeling to simulate and analyze the process of evolution. Specific areas of research include the evolution of complex genetic systems that can undergo both natural selection and recombination and the evolution of learning as one interface between modern methods in artificial intelligence and models of biological processes, including communication. He also studies the evolution of modern humans using models for the dynamics of molecular polymorphisms, especially DNA variants. He is managing editor of *Theoretical Population Biology* and associate editor of *Genetics* and of *Complexity*. Dr. Feldman is a member of the American Society of Naturalists, and the American Society of Human Genetics, and a fellow of the American Academy of Arts and Sciences. He received his B.Sc. in 1964 from the University of Western Australia, his M.Sc. in 1966 from Monash University, Australia, and his Ph.D. in biomathematics from Stanford in 1969.

DAVID K. GIFFORD is a professor of electrical engineering and computer science at the Massachusetts Institute of Technology. He is working on the analysis of RNA expression data using graphical models. Professor Gifford has also developed programmed mutagenesis, a technique for programmatically rewriting DNA sequences by incorporating sequence-specific oligonucleotides into newly manufactured strands of DNA. Dr. Gifford serves as group leader for the Programming Systems Research Group at the MIT Laboratory for Computer Science. This group is dedicated to finding new ways of programming existing systems and developing new programmable systems. The group's efforts concentrate on combining existing technologies and inventing new ones to deliver new ways of computing in selected areas: programming language development; information discovery, retrieval, and distribution; algebraic and computational video; and most recently, computation using biological substrates. Dr. Gifford earned his S.B. in 1976 from MIT and his M.S. and Ph.D. in electrical engineering from Stanford University in 1978 and 1981, respectively. He is a tenured member of the MIT faculty, which he joined in 1982. He was appointed to the Karl Van Tassel Career Development Chair at MIT in 1990.

TAKEO KANADE received his Ph.D. in electrical engineering from Kyoto University, Japan, in 1974. After being on the faculty in the Department of Information Science, Kyoto University, he joined the Computer Science Department and Robotics Institute in 1980. He became associate professor in 1982, a full professor in 1985, the U.A. and Helen Whitaker Professor in 1993, and a University Professor in 1998. He has been the Director of the Robotics Institute since 1992. He served as the founding chairman (1989-1993) of the robotics Ph.D. program at Carnegie Mellon University, probably the first of its kind in

the world. Dr. Kanade has worked in multiple areas of robotics, ranging from manipulator, sensor, computer vision, and multimedia applications to autonomous robots, with more than 200 papers on these topics. He is the founding editor of the *International Journal of Computer Vision*. Dr. Kanade's professional honors include election to the National Academy of Engineering, a fellow of the IEEE, a fellow of the ACM, and a fellow of the American Association of Artificial Intelligence, and several awards including the Joseph Engelberger Award, Yokogawa Prize, JARA Award, Otto Franc Award, and Marr Prize Award.

STEPHEN S. LADERMAN is the manager of the Molecular Diagnostics Department, dedicated to molecular biology, biochemistry, computational biology, and engineering for the development of genetic, genomic, and proteomic analysis systems for biomedical research and molecular diagnostics. He earned his B.A. in physics, magna cum laude, from Wesleyan University in 1976 and his Ph.D. in materials science and engineering from Stanford University in 1983. Dr. Laderman was a postdoctoral Scholar from 1982 to 1984 at Stanford University and Exxon Research Corporation. Before joining Agilent Labs, he worked in a variety of positions at Hewlett-Packard Laboratories. Dr. Laderman was a member of the Basic Energy Sciences Advisory Committee Panel on Novel, Coherent Light Sources and chair of the selection committee for the George E. Pake Prize of the American Physical Society. He is currently a member of the International Society for Computational Biology, American Society of Human Genetics, American Physical Society, American Chemical Society, American Association for the Advancement of Science, and a senior member of the IEEE.

JAMES S. SCHWABER is associate professor of pathology, anatomy and cell biology at Thomas Jefferson University Medical College (TJU) and is Director of the Daniel Baugh Institute for Functional Genomics and Computational Biology at TJU. Prior to joining TJU in 2000, he was technical leader and research fellow of the Computational Biology Program in the Core Genomics Group at DuPont. His interest is in neuron and neuronal network modeling (e.g., of cardiorespiratory control functions) and, in particular, how alterations in neuron properties will be dependent on input activity over time, by linking the molecular processes activated by synaptic inputs to cell physiology. His research group focuses on computational analysis of genomic datasets from functionally identified neurons as a cornerstone to support modeling of the adaptive intracellular response to synaptic inputs. Currently the work is related to systems analysis of gene regulatory circuits, the modeling of neuronal inputs into these circuits as modular patterns of transcription factor activation, and the central issue of discovering principles that relate gene output to functional phenotype (electrophysiology; models of ion fluxes) at the systems level.

C.2 STAFF MEMBERS

Herbert S. Lin is senior scientist and senior staff officer at the Computer Science and Telecommunications Board (CSTB), National Research Council (NRC) of the National Academies, where he has been the study director for major projects on public policy and information technology. These studies include a 1996 study on national cryptography policy (*Cryptography's Role in Securing the Information Society*), a 1991 study on the future of computer science (*Computing the Future*), a 1999 study of Defense Department systems for command, control, communications, computing, and intelligence (*Realizing the Potential of C4I: Fundamental Challenges*), and a 2000 study on workforce issues in high technology (*Building a Workforce for the Information Economy*). Prior to his NRC service, he was a professional staff member and staff scientist for the House Armed Services Committee (1986 to 1990), where his portfolio included defense policy and arms control issues. He also has significant expertise in math and science education. He received his Ph.D. in physics from MIT in 1979. Avocationally, he is a long-time folk and swing dancer, and a poor magician. In addition to his CSTB work, he is published in cognitive science, science education, biophysics, and arms control and defense policy.

Robin Schoen is the director of the Board on Agriculture and Natural Resources (BANR) of the National Academies. Prior to joining BANR in March 2005, she was a senior program officer for the Academies' Board on Life Sciences, where she directed several studies, including *Discovery of Antivirals Against Smallpox; Stem Cells and the Promise of Regenerative Medicine; The National Plant Genome Initiative: Objectives for 2003-2005; Sharing Publication-Related Data and Materials: Responsibilities of Authorship in the Life Sciences;* and a BANR study titled *Predicting Invasions of Nonindigenous Plants and Plant Pests*. Robin received a B.S. in biology and chemistry from Frostburg State College, Maryland, and an M.A. in science and technology policy from George Washington University.

C.3 REPORT COORDINATOR

Russ Biagio Altman is a professor of genetics, bioengineering and medicine (and of computer science by courtesy) at Stanford University. His primary research interests are in the application of computing technology to basic molecular biological problems of relevance to medicine. He is currently developing techniques for collaborative scientific computation over the Internet, including novel user interfaces to biological data, particularly for pharmacogenomics. Other work focuses on the analysis of functional microenvironments within macromolecules and the application of nonlinear optimization algorithms for determining the structure and function of biological macromolecules, particularly the bacterial ribosome. Dr. Altman holds an M.D. from Stanford Medical School, a Ph.D. in medical information sciences from Stanford, and an A.B. from Harvard College. He has been the recipient of the U.S. Presidential Early Career Award for Scientists and Engineers, an NSF Career Award, and the Western Society of Clinical Investigation Annual Young Investigator Award. He is a fellow of the American College of Physicians and the American College of Medical Informatics. He is a past-president and founding board member of the International Society for Computational Biology, an organizer of the annual Pacific Symposium on Biocomputing, and an associate editor of the journal *Bioinformatics*. He currently directs the Stanford Center for Biomedical Computation and the training program in Biomedical Informatics, and he won the Stanford Medical School graduate teaching award in 2000.